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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	MICHAEL O'CONNOR, et al.	§	Group Art Unit:	2851
Serial No.:	09/885,231	§	Examiner:	David B. Esplin
Filed:	June 19, 2001	§	Atty. Dkt. No.:	ITL.0784US
For:	PROJECTION ENGINE	§		

Board of Patent Appeals & Interferences
Commissioner for Patents
Washington, D.C. 20231

APPEAL BRIEF

Sir:

Applicants respectfully appeal from the final rejection mailed August 2, 2002, finally rejecting claims 20-28.

I. REAL PARTY IN INTEREST

The real party in interest is the assignee Intel Corporation, the assignee of the present application by virtue of the assignment recorded at Reel/Frame 012271/0848.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

III. STATUS OF THE CLAIMS

The application was originally filed with claims 1-54. Claim 55 was added and claims 34-47 and 52-54 were cancelled in a Reply to Office Action filed June 26, 2002. Pending claims 1-19, 29-33, 48-51, and 55 are all allowed. Claims 20-28 were finally rejected under 35 U.S.C. §

103(a) over U.S. Patent No. 6,309,071 (Huang) in view of U.S. Patent No. 6,144,420 (Jung). Claims 20-28 are the subject of this appeal.

IV. STATUS OF AMENDMENTS

No amendments were filed subsequent to the final rejection. However, Applicants filed a Reply to Final Action on August 29, 2002. The Examiner mailed an Advisory Action on September 24, 2002.

V. SUMMARY OF THE INVENTION

The present invention relates generally to light engines for projection display devices, and more particularly to an improvement that takes advantage of color switching and/or both polarizations of light generated by their light sources.

FIG. 2 illustrates one embodiment of a two-kernel dual polarization projection engine 5 constructed according to the principles of this invention. The projection engine includes a polarization separator 6, a first light engine kernel 8 (Kernel A), a second light engine kernel 10 (Kernel B), and a polarization combiner 12. In one embodiment, the polarization separator is built using a first plate polarizer, the first and second kernels are built using first and second PBS's 32, 48 respectively, and the polarization combiner is constructed using a third PBS 13. Specification, p. 3.

Input light 14 from a light source (Light Source) may be pre-filtered to substantially eliminate the infrared and ultraviolet, but substantially all of the light in the visible portion of the spectrum may be retained in the input beam rather than being discarded. Thus, the input beam Lr may include randomly polarized components Gr, Rr, and Br (not shown). The polarization separator reflects the S components Ls to the first kernel and passes the P components Lp to the second kernel. Specification, p. 4.

Kernel A is illustrated as a complete, two-panel system, meaning that it is equipped to modulate all three colors. A color switch 20 alternately blocks each of two of the colors, and in some embodiments may switch at a frequency of at least 120Hz. In the mode shown, the color switch 20 switches the red and green components, while the blue component is not switched. For ease of illustration, switched light components are indicated by dashed lines, while non-switched components are indicated by solid lines. After passing through the switch, the light may pass through a filter and clean up polarizer 26, 28. Of course, various filters and polarizers can be selected to optimize the light engine kernel performance depending on choices in PBSs and SLMs. Specification, p. 4.

The S polarized light Ls reflected from the polarization separator enters the PBS 32 of the first kernel, where the non-switched (blue) component Bs is reflected by the PBS through a quarter-wave plate 33 to a first SLM 34 (the blue SLM). The first SLM modulates the non-switched component to insert image content for that color and reflects it back through the quarter-wave plate to the PBS. The two transits of the blue component through the quarter-wave plate convert it from S to P polarization. The modulated blue light Bp then passes back through the PBS toward the polarization combiner 12. The switched components (red and green) Rp, Gp are, during their respective switching periods, passed through the PBS 32, through a quarter-wave plate 35, and then to a second SLM 36 (the red/green SLM). The second SLM is coordinated with the switch, to modulate the light color passed by the switch and insert image content for that color, during that color's switching period. The modulated light from the second SLM is reflected by the SLM through the quarter-wave plate into the PBS. The two transits of the red or green light through the quarter-wave plate convert their polarization from P to S, yielding Rs and Gs. The PBS reflects the modulated and multiplexed Rs and Gs components

toward the polarization combiner. Thus, at any given moment, the output of Kernel A includes a modulated non-switched component of a first color (blue), and a modulated, switched component of one of the other colors (red or green). This beam may be passed through filters and polarizers as needed, as illustrated generally as 38. Specification, p. 4.

Back at the polarization separator 6, the P components are passed to the second kernel 10 (Kernel B), where they pass through a second switch 22. This switch is operated very much like the first switch of Kernel A. It is not, however, necessary for the same color to be the non-switched color in both kernels. As shown, red is the non-switched color in Kernel B, and is passed through a second PBS 48 to a quarter-wave plate 49 and then to a third SLM 50 (red SLM), which modulates the red light. The switched color components (green and blue) are reflected by the second PBS through a quarter-wave plate 51 to a fourth SLM 52 (green/blue SLM) which modulates the light to insert green image content and blue image content during their respective switching periods. The modulated green and blue light are passed through the PBS to rejoin the non-switched red light. The second kernel includes filters and polarizers as needed, generally illustrated as 42, 44, and 54. The modulated light from the first and second kernels arrive at the polarization combiner 12, where they are combined to emerge as the modulated output beam 16 containing both polarizations' light components. Specification, p. 5.

FIG. 3 illustrates another embodiment of a two-kernel dual polarity projection engine, which differs from that of FIG. 2 in that it uses three-color switches 60 and 62 rather than two-color switches, and it uses only a single SLM 66 and 70, respectively, in each of its two kernels. The three-color switch and single SLM may typically be operated at a frequency above 180Hz, in some applications. Specification, p. 5.

FIG. 6 illustrates another embodiment of a composite-image application of the invention, as a dual polarization display engine (DPDE). Light from a light source is provided to a polarization separator, which sends light of a first polarization L1 to a first switch (Switch A) and light of a second polarization L2 to a second switch (Switch B). Switch A filters L1 into color bands C1-C3 and Switch B filters L2 into color bands C4-C6. Switch A receives a first switch control signal (Switch Control Signal A), controlling how it switches between at least two of the colors (e.g. C1 and C2). Switch B receives a second switch control signal (Switch Control Signal B), controlling how it switches between at least two of the colors (e.g. C4 and C5). Specification, p. 6.

Light from the first switch is provided to the first kernel's (Kernel A) one or more first SLM's (SLMs A) which are fed by one or more image signals (Image Signal A). Light from the second switch is provided to the second kernel's (Kernel B) one or more second SLM's (SLMs B) which are fed by one or more image signals (Image Signal B). As above, more than two of the colors may be switched in any given switch, depending upon the number of colors (say N in Kernel A and Q in Kernel B) that the switch separates the incoming light into and the number of SLMS (say M in Kernel A and P in Kernel B) that are fed by that switch. Specification, pp. 6-7.

VI. ISSUES

A. Are Claims 20-28 Patentable Under 35 U.S.C. § 103(a) Over Huang In View of Jung?

VII. GROUPING OF THE CLAIMS

For purposes of this appeal, Applicants have grouped together claims 20-28.

VIII. ARGUMENT

A. Claims 20-28 Are Patentable Under 35 U.S.C. § 103(a) Over Huang In View of Jung

The apparatus of claim 20 includes "means for spatially substantially separating the input light into first light having a first polarization and second light having a second polarization different than the first polarization"; "first means for inserting content into the first light, the first means for inserting including means for switching at least two color components of the first light"; "second means for inserting content into the second light, the second means for inserting including means for switching at least two color components of the second light"; and "means for combining the content-inserted first and second light to create the output light."

The Examiner rejected claims 20-28 over U.S. Patent No. 6,309,071 (Huang) in view of U.S. Patent No. 6,144,420 to Jung under 35 U.S.C. § 103(a). This rejection is improper.

The Examiner admits that Huang does not disclose a "means for switching" within first and second means for inserting content. Final Office Action, p. 2. Instead, Huang teaches a display system in which color is switched by a color wheel 114. This color wheel 114 stands alone is not included in another component, such as the polarizing beam splitters or polarized light modulators (*e.g.*, 122 and 148/150). Thus Huang does not teach or suggest first and second "means for inserting content" "including means for switching".

Nor does Jung teach or suggest first and second "means for inserting content" "including means for switching". In this regard, Jung teaches a display system in which color is switched by a color wheel 170. As with Huang, this color wheel 170 stands alone is not included in another component, such as the polarizing beam splitter, dichroic beam splitter or imaging units (*e.g.*, 130, 140 and 165). Thus Jung also does not teach or suggest first and second "means for inserting content" "including means for switching".

The Examiner states however, that it would have been obvious to "provide color switching means in a system, like the one disclosed by Huang, in the optical light paths leaving

the separation polarizing beam splitter, as is shown by Jung to be well known... ." Final Office Action, p. 3. Applicants respectfully disagree.

Claim 20 does not recite that the switching means is provided in optical light paths leaving a separation polarizing beam splitter as apparently contended by the Examiner. Instead, claim 20 recites that "means for switching" are included in "means for inserting content." As discussed above, Jung does not teach or suggest "means for inserting content" "including means for switching" as recited by claim 20. Instead, Jung discloses that the "color wheel 170 is disposed between the polarization beam splitter 130 and the fourth imaging unit 165 ...." Jung, 5:5-6. Thus nowhere does Jung (or Huang) teach or suggest "means for inserting content" "including means for switching" as recited by claim 20. Accordingly, not only is there no teaching in either reference that the means for inserting content include means for switching, there is no motivation to combine the references to obtain this element.

In an Advisory Action mailed September 24, 2002, the Examiner appears to admit that the prior art does not teach or suggest that "means for switching is included in the means for inserting content...." Advisory Action, p. 2. The Examiner then contends that the specification of the application shows that "the switching is carried out by a component different from the component that inserts content." *Id.* However, this is incorrect. As taught by the specification, embodiments of the present invention may include several kernels each of which is "a complete, two-panel system, meaning that it is equipped to modulate all three colors." Specification, page 4. More so, as shown in FIG. 2, these kernels (respectively 8 and 10) each include a color switch (respectively 20 and 22) and modulators to insert content (*e.g.*, 36 and 52). Thus the Examiner is incorrect in this regard.

Further, Jung does not teach or suggest use of two "means for switching" included in two separate means for inserting content. That is, claim 20 recites both first and second "means for inserting content," each "including means for switching." Only a single color wheel 170 is present in Jung. More so, Jung does not teach or suggest "means for switching at least two color components of the first light" and "means for switching at least two color components of the second light", as recited by claim 20, as only a single light passes through the single color wheel 170. Thus Jung does not teach or suggest the claimed plural "means for switching", nor such switching means of first and second lights. Nor does Huang teach or suggest such plural means, as only a single color wheel 114 exists in Huang.

The proposed combination is thus improper. As described above, not all of the claim elements are even taught or suggested by the prior art. Further, there is no motivation or suggestion to combine Huang with Jung. Thus claims 20-28 are patentable over the proposed combination. Accordingly, the Examiner's rejection is improper and should be reversed.

IX. CONCLUSION

Since the rejection of the claims is improper, it should be reversed.

Respectfully submitted,

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APPENDIX OF CLAIMS

The claims on appeal are:

20. An apparatus for receiving input light and for providing output light, the apparatus comprising:

means for spatially substantially separating the input light into first light having a first polarization and second light having a second polarization different than the first polarization;

first means for inserting content into the first light, the first means for inserting including means for switching at least two color components of the first light;

second means for inserting content into the second light, the second means for inserting including means for switching at least two color components of the second light; and

means for combining the content-inserted first and second light to create the output light.

21. The apparatus of claim 20 wherein:

the first and second means for inserting comprise, respectively, first and second polarization beam splitters.

22. The apparatus of claim 20 wherein:

the first and second means for inserting comprise, respectively, first and second plate polarizers.

23. The apparatus of claim 20 wherein:

the first means for switching comprises a two-color switch.

24. The apparatus of claim 23 wherein:

the two-color switch is for switching between green and blue.

25. The apparatus of claim 23 wherein:

the two-color switch is for switching between cyan and yellow.

26. The apparatus of claim 20 wherein:

the first means for switching comprises a three-color switch.

27. The apparatus of claim 26 wherein:

the three-color switch is for switching between red, green, and blue.

28. The apparatus of claim 26 wherein

the three-color switch is for switching between cyan, magenta, and yellow.